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## The Role of Airstrikes in Attaining US Objectives in North Vietnam

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FOREWORD

This report presents an analysis of the Rolling Thunder air offensive against North Vietnam, estimates the physical damage and human casualties resulting from the air campaign, and analyzes the US and South Vietnamese air operations employed to obtain these effects. Finally, the report evaluates the potential of air attacks as a weapon to achieve the stated objectives of the Rolling Thunder program, and considers alternative courses of action which are believed to be more promising ways of achieving the Rolling Thunder objectives. For purposes of comparison, some capsule evaluations of US experience gained from the air wars against Japan, Germany, and North Korea also are presented.



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THE ROLE OF AIRSTRIKES  
IN ATTAINING US OBJECTIVES IN NORTH VIETNAM

Findings and Conclusions

Findings

1. The bombing of North Vietnam under the ground rules and at the force levels which applied in 1965 has obviously not achieved its major objectives -- reduction of the flow of supplies to the insurgent forces in the South and the forcing of Hanoi to enter into negotiations. Although the movement of men and supplies in North Vietnam has been hampered and made somewhat more costly, the Communists have been able to increase the flow of supplies and manpower to South Vietnam. Hanoi's determination to continue its policy of supporting the insurgency in the South appears as firm as ever. As a manifestation of US support and positive action in behalf of South Vietnam, the Rolling Thunder program has been more successful in attaining its third objective -- bolstering the confidence and morale of the South Vietnamese.

2. Even if the weight of attack were to be substantially increased, it is estimated that a continuation of the bombing under the ground rules which applied in 1965, and which are currently being followed, would not achieve the first two objectives noted above.

3. Air attacks almost certainly cannot bring about a meaningful reduction in the current level at which essential supplies and men flow into South Vietnam. Air attacks can, however, increase significantly the costs and difficulties associated with North Vietnam's support of the Communist forces in the South, complicate greatly the problem of maintaining essential economic activity in the North, and thereby bring meaningful pressures on the Hanoi regime. Therefore, it is concluded that, under drastically revised ground

rules, particularly through the removal of limitations on geographic areas which can be taken under attack, and with a significant revision of the target systems selected and the manner in which they are attacked, airstrikes against North Vietnam would be much more likely to contribute to the achieving of US objectives.

4. The effectiveness of air attacks in reducing the flow of supplies to a critical point is in large measure dependent on the course of ground combat in the South. Military action in South Vietnam against the Viet Cong and the regular units of the North Vietnamese army and their bases in South Vietnam on the one hand and the neutralization of their support facilities in North Vietnam on the other are complementary measures. Therefore, escalating the level of combat in South Vietnam is of major importance. The result would be substantially increased requirements for supplies from external sources to sustain the insurgency. These requirements could be increased to the point where the capacity of Communist overland supply routes would be tested and the costs of furnishing logistic support to the insurgent forces could be sharply boosted, particularly if local sources of supply in South Vietnam can be denied.

5. The choice of alternative target systems which might be attacked is limited. Neutralization of many of the target choices would have no direct impact on the course of the war since few of North Vietnam's economic resources are directly committed to the effort. An additional and fairly severe limitation on the choice of target systems results from the early stage of escalation in the present conflict. Without a declaration of war or a much higher degree of escalation, resort to unrestricted aerial warfare, including mass attacks on populated areas, does not appear to be a possible course of action at this time.

### Conclusions

1. The US ground rules under which the air campaign against North Vietnam is waged should undergo drastic revision in order to enable conventional airstrikes to make a meaningful contribution to the achievement of the major US objectives.

2. More emphasis in air attacks should be placed on military-related targets in the northern part of the country. Sustained harassment of traffic movements in the southern regions (and Laos) on a more limited scale would contribute to the achievement of the overall objectives, but greater effort in the northern area of North Vietnam should increase the returns from air attacks.

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3. A program of air attacks designed to optimize the furthering of these objectives at this stage of the war in South Vietnam would include the following targets. In combination, these attacks are clearly identified as against military or militarily related targets. They are neither directed at nor expected to bring about the collapse of the regime.

a. First, the neutralization of petroleum (POL) storage facilities and the Haiphong cement plant.\* This should be done as quickly as possible to maximize effectiveness and prevent the North Vietnamese from taking countermeasures. The result would be to present the Communists with a major problem of military and economic supply, to complicate essential reconstruction, and to increase import requirements significantly.

b. Following neutralization of these facilities, the interdiction of the ports by mining, to throw the burden of military and economic supply primarily onto the rail lines, which probably would not be able to handle all import requirements. Coastal and inland waterways and highways would be used to an increased extent to help cope with the supply problem and would themselves begin to present more lucrative traffic targets.

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\* Recent intelligence indicates that the Sao Vang rubber factory at Hanoi is producing truck tires and therefore falls in the category of war-supporting industry in the same manner as the cement plant.

c. Following the mining of the ports, the concentration of bombing attacks on the China-North Vietnam lines of communication (LOC's), particularly the key rail targets. This effort, including 24-hour armed reconnaissance against rail, highway, and coastal and inland water traffic, should begin to bite into the essential traffic flows needed to keep the economy functioning normally. The cost of maintaining a flow of military-economic supplies would be very greatly raised over current levels.

d. The neutralization of selected military barracks and supply facilities if reconnaissance shows them to be in active use. Again, the attack should be carried out as quickly as possible since these facilities will probably be abandoned after the first strike.

e. The pre-strike estimates (DIA/JCS) of civilian casualties, assuming conditions of daylight alert, for the attacks against these fixed targets is less than 700. This is a minimum figure and would increase if shelter measures were ineffective or not taken, or if the assumed accuracy of the airstrikes were reduced. On the basis of 1965 experience the postulated armed reconnaissance sorties could result in as many as 1,000 casualties a month. Most of these, however, would be civilians directly engaged in moving logistic supplies or in keeping the lines of communication open.

f. It is recognized that strikes against previous sanctuary areas, particularly Hanoi, would probably lead to engagement of North Vietnamese air forces. Therefore, in carrying out the attacks outlined above, increased sorties to neutralize the air force and air defense forces would be necessary.

## I. Objectives of the Rolling Thunder Program

The Rolling Thunder program, a systematic but restrained air offensive against selected economic and military targets in North Vietnam, was begun on 2 March 1965. The basic objectives of the air attacks on North Vietnam have been made clear in public statements by the President and other high officials of the US Government. These objectives are (a) to reduce the ability of North Vietnam to support the Communist insurgencies in South Vietnam and Laos; (b) to increase progressively the pressure on North Vietnam to the point where the regime would decide it was too costly to continue directing and supporting the insurgency in the South; and (c) to bolster the confidence and morale of the South Vietnamese.

## II. The Logistics Target System\*

North Vietnam's major contributions to the war in the South are its military manpower, its function as the control center for the insurgency, and its function as the logistic funnel through which materiel, mostly from the USSR and Communist China, is moved into South Vietnam. Consequently the attainment of the first objective of Rolling Thunder hinges almost exclusively on our ability to impede or to stop the flow of men and supplies from North Vietnam to South Vietnam. The logistics target system which must be attacked to meet this objective is of such a rudimentary nature, and the volume of traffic so small, that conventional air attack, particularly at the levels of 1965, is most unlikely to be an adequate weapon.

Under present combat conditions the Viet Cong and North Vietnamese forces are estimated to be dependent on external sources for less than 20 percent of their total daily logistic requirement. This movement from North Vietnam requires the use of less than 5 percent of the capacity of the supply corridor through Laos alone. Indeed, the capacity of this single route can provide the tonnage required from external sources even if the level of the Communist forces increases by nearly 40 percent and the intensity of combat reaches a scale more than 10 times its present level.\*\* Although the capacity of the Communist

\*\* These figures pertain to illustrative projections which attribute to the Viet Cong and North Vietnamese main forces a capability to build up by the end of 1966 to a level of 155 battalion equivalents fighting once in every 3 days.

supply routes could be tested by heavy attacks with air weapons currently available; we believe that despite such attacks the land corridor could supply all logistic requirements even if the expanded Viet Cong and North Vietnamese forces were made completely dependent on external sources. To do so, however, would require a heavy commitment of manpower and materials to repair damage to lines of communication.

Even if the land route through Laos were successfully interdicted, the North Vietnamese could fall back on alternative infiltration routes to South Vietnam by sea or from Cambodia. These alternative routes probably would be adequate to enable the Communists to maintain their present level of activity, and to step up the firepower of their forces. These routes would also support an increase of present forces by as much as 40 percent, provided the level of fighting remained approximately at its present level.

### III. The Rolling Thunder Attack\*

#### A. Factors Conditioning the Nature and Scale of Attacks

The US and South Vietnamese air campaign against North Vietnam has been one of the most restricted and voluntarily limited air campaigns ever conducted by a major air power. It has been used as a carefully controlled means of gradual escalation to achieve strictly limited objectives. Consequently, the program has operated under a set of rigorously defined ground rules.

Self-imposed restrictions have limited both the choice of targets and the areas to be bombed. The existence of large restricted areas has effectively insulated almost 80 percent of North Vietnam's limited modern industrial economy from air attack; these areas contain 75 percent of the nation's population and the most lucrative military supply and LOC targets. In addition to area restrictions which limit armed reconnaissance attacks, there are specific sanctuary areas which are exempt from air attack. These areas include a 30-nautical-mile (nm) buffer zone along the Chinese border, a 30-nm radius around the city of Hanoi, and a 10-nm radius around the city of Haiphong.

Attacks on specific fixed targets are now limited to those approved in each Rolling Thunder program. These authorizations often provide additional restrictions limiting the number of strikes against approved targets and, in effect, exempt some types of targets from

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attack. There is, however, more flexibility in the type of targets for armed reconnaissance. A major restriction is the policy decision to avoid civilian casualties to the extent possible, which has resulted in many targets outside of the sanctuary areas not being approved for attack.

The overall effect of these area and operational restrictions has been to grant a large measure of immunity to the military, political, and economic assets used in Hanoi's support of the war in the South. The restrictions also insure an ample flow of military supplies from North Vietnam's allies. The preconditions established for the number of strikes and sorties, the methods of attack, and the avoidance of civilian casualties result in an operational disregard of basic principles of target selection. Among North Vietnam's target systems, not one has been attacked either intensively or extensively enough to provide a critical reduction in national capacity. No target system can be reduced to its critical point under existing rules.

Finally, the voluntary choice of such ground rules may well give the Hanoi regime an impression of divided counsel within the US Government. The limited nature of the US air attacks after the bombing pause may reinforce Hanoi's possible judgment that this restraint reflects a divisiveness and US reluctance to escalate the war.

#### B. Analysis of Rolling Thunder Operations

The Rolling Thunder attack on North Vietnam from 2 March 1965 through 19 February 1966 delivered a total of 37,000 tons of ordnance on more than 140 fixed targets and numerous targets of opportunity. A total of 42,597 sorties were flown -- approximately 57 percent by the US Navy, 41 percent by the US Air Force, and 2 percent by the South Vietnamese Air Force. Attack sorties -- strike and flak suppression -- accounted for over 60 percent of total sorties. In terms of ordnance expended the Navy-Air Force relationship was reversed, with the Air Force accounting for 62 percent of the total. This reflects the fact that the average ordnance load of sorties flown by the Air Force is slightly more than twice the average load for sorties flown by the Navy. Or stated differently, the Navy must fly twice as many sorties to deliver a given weight of ordnance in the target area.

A total of 181 aircraft and 154 men were lost. The estimated cost of ordnance expended, aircraft lost, and sortie overhead comes to a total of about \$470 million. The assessable return in dollar terms

from this attack is \$63 million in damage to economic and military facilities in North Vietnam.

Of the targets on the current JCS Target List that are outside sanctuary areas, all but 30 have been struck. Thus the opportunities within existing restrictions for striking new and important fixed targets are extremely limited. As a result of the lack of fresh fixed targets, armed reconnaissance is constituting an increasing share of the total Rolling Thunder attack. Armed reconnaissance has accounted for over 72 percent of total sorties flown and has delivered 68 percent of the ordnance expended by Rolling Thunder, but has accounted for only 21 percent of the estimated cost of damage to North Vietnam. The targets struck on armed reconnaissance usually involve lower restoration costs than do fixed targets, so the effectiveness of the program must be measured primarily in military, political, and psychological terms rather than economic.

The analysis of the air effort against North Vietnam in relation to total air activities in the Vietnamese war shows rather strong fluctuations in the weekly level of activity. This analysis suggests that these fluctuations may reflect a need to shift aircraft temporarily from attack on North Vietnam to support ground operations in South Vietnam or to attack targets in Laos.

There is a direct connection between losses and number of sorties flown, but the ratio of loss to sorties is higher for fixed target strike sorties than for armed reconnaissance strike sorties.

The air attack capability in the Southeast Asian area, including the B-52's in Guam, as indicated by performance in December 1965, is of course much greater than the effort levied against North Vietnam in 1965 and stands at about 630 sorties per day, or more than 26,000 tons of ordnance per month. This capability is directed against the three principal target areas -- South Vietnam, North Vietnam, and Laos -- as military and political requirements dictate. During the latter part of 1965, approximately 20 percent of the total air attack on the three areas was directed against North Vietnam.



IV. Effects of the Rolling Thunder Program\*A. Physical Effects

The estimated dollar cost for the restoration of economic and military targets attacked in the Rolling Thunder campaign is less than 10 percent of the value of the economic aid given to North Vietnam in recent years by Communist countries.

Restoration Costs of Facilities Attacked by the Rolling Thunder Program			
Million US \$			
	<u>Economic</u>	<u>Military</u>	<u>Total</u>
Attacks on fixed targets	23.6	26.4	50
Armed reconnais- sance missions	12.8	0.7	13
Total	<u>36</u>	<u>27</u>	<u>63</u>

Each month there has been a decreasing return in terms of bomb damage as fewer fixed targets outside the restricted area are available for attack and armed reconnaissance accounts for a greater share of the total air effort. The return has been particularly small since the resumption of bombing as a result of confining most of the effort to the low-value target system in the southernmost parts of North Vietnam.

About 57 percent of the total damage -- \$36 million -- is attributable to the destruction of economic targets. This cost has been broadly distributed throughout the economic sector, and no one sector has been forced to bear unacceptably high levels of damage. In terms of national capacity the greatest damage was inflicted on electric power and petroleum storage facilities. These target systems lost 27 and 17 percent, respectively, of their national capacity. In each case, however, the target system had adequate cushion in the form of excess capacity to absorb these attacks, and economic activity could therefore be maintained at almost normal levels.

The damage to military facilities is just over \$27 million. Almost 60 percent of this damage was to military barracks, but the effect has been negligible. The damage to military targets has shown a definite downward trend since the peak month of July 1965.

The damage to military facilities not only has resulted in losses of equipment but also has prompted the abandonment of installations such as airfields and the dispersal of equipment and supplies normally stored in ammunition and supply depots.

#### B. Estimated Casualties

The United States has placed restrictions on the air offensive against North Vietnam in order to minimize civilian casualties. It has been to North Vietnam's interest to assert otherwise, however, and propaganda media attempt to give the impression that the air offensive has been a vicious and unrestrained assault on the civilian population, hospitals, schools, and other nonmilitary objectives. Nevertheless, in only one instance have Hanoi officials presumed to provide a total for the number of casualties. In September, Egyptian journalists were told that total casualties were 75,000, including 40,000 killed and 35,000 wounded. No procedures devised in this report for the purpose of estimating casualties can support a figure of this magnitude.

Although the Rolling Thunder program has flown many thousands of attack sorties against targets in North Vietnam, the toll in human casualties has been light. Based on sample data, through the end of 1965, North Vietnamese casualties -- both civilian and military -- are estimated to have ranged from 11,700 to 14,800, divided about equally between killed and wounded.

	<u>Estimated Casualties Resulting from Rolling Thunder</u>		
	<u>Military</u>	<u>Civilian</u>	<u>Total</u>
Attacks on fixed targets	3,900 to 4,700	1,700 to 2,400	5,600 to 7,100
Armed reconnais- sance missions	2,600 to 3,200	3,500 to 4,500	6,100 to 7,700
Total	<u>6,500 to 7,900</u>	<u>5,200 to 6,900</u>	<u>11,700 to 14,800</u>

About 55 percent of these casualties were military personnel. The strikes against JCS-designated fixed targets produced about two military for each civilian casualty, whereas the armed reconnaissance missions produced proportionately greater civilian casualties.

The civilians killed or injured by armed reconnaissance attacks were for the most part truck drivers or transport and construction workers rather directly engaged in maintaining the logistic pipeline to South Vietnam.

Approximately 3,000 civilian deaths (one-half of total civilian casualties) as a result of military action against North Vietnam is a small number. The impact of 3,000 civilian casualties is slight in a country where over 350,000 persons died in 1965 from other causes and where the accidental deaths alone produced casualties some three to five times greater than those resulting from the Rolling Thunder program.

#### C. North Vietnamese Countermeasures

The economic and military damage sustained has presented an increasing but still moderate bill to Hanoi, which in large measure can be (and has been) passed along to Moscow and Peiping.

The major effect of the attack on North Vietnam has been to force Hanoi to cope with disruption to normal economic activity, particularly in transportation and distribution. Reconstruction efforts have been hampered by difficulties in allocating manpower. The regime has relocated large elements of its urban population. Problems in the distribution of food have appeared, although these problems are not yet pressing. Where the bombing has hurt most has been in its disruption of the road and rail nets and in the very considerable repair effort which became necessary. On the other hand, the regime has been singularly successful in overcoming US interdiction efforts.

Much of the damage has been to installations which the North Vietnamese do not need to sustain the military effort. No attempt to restore petroleum storage facilities has taken place and only recently have there been indications of intent to repair some of the damaged electric power stations. In both cases the failure to restore or repair is explained by the existence of adequate excess capacity or the fact that the facilities which have been attacked were not of vital importance.

A similar phenomenon is noted in the absence of repair of military facilities. The military have chosen not only the outright abandonment of facilities such as barracks, but also the dispersal of the material usually stored in ammunition and supply depots.

An examination of destroyed and damaged facilities shows that only a small number were truly essential to the war effort. The major essential restoration has consisted of measures to keep traffic moving, to keep the railroad yards operating, to maintain communications, and to replace transport equipment and equipment for radar and SAM sites. These measures have probably been effected at a cost of between \$4 million and \$5 million, or between 5 and 10 percent of the total economic and military damage sustained in North Vietnam to date.

The increasing Soviet and Chinese commitments to sustain the flow of military and economic aid to North Vietnam imply an obligation to underwrite the economic restoration of the country on a grant basis or on favorable terms. This assurance is almost certainly a controlling determinant in Hanoi's attitude toward the loss of its economic facilities. In the Korean War, more severe economic losses did not deter P'yongyang during the conflict, and restoration assistance was provided by both China and the USSR.

Support of the insurgency in the South has been only indirectly affected by the bomb damage. North Vietnam's major inputs to the conflict in the South are its provision of military leadership and manpower and its function as the control center and logistic base for the Viet Cong and North Vietnamese force. North Vietnam serves essentially as the logistic funnel through which the flow of military supplies, particularly weapons and ammunition from the USSR and China, is maintained.

Despite the concentration of allied attacks in the South and in Laos and the resumption of bombing in the North, the movement of trucks during the current dry season along the infiltration routes through Laos is twice the level of a year ago, and the North Vietnamese are using larger trucks with heavier loads. The North Vietnamese through intensive efforts have increased the capacity of the lines of communication and made them less vulnerable to air attack. They have built new bypasses and ferries to circumvent bombed bridges, improved old roads and trails, and are constructing new roads. In several instances, roads previously limited to dry-season operation now have an all-weather capability. The current dry-season capacity of the interdicted route through Laos is adequate to accommodate a buildup

of the Viet Cong and North Vietnamese main force of at least 40 percent and an intensity of combat more than 10 times the present level. This estimate excludes any effect of attacks on truck traffic.

This ability to react and to offset the effects of the air attacks has not been without its costs. It is estimated that the diversion of manpower to tasks associated with dispersal programs and emergency repair and maintenance of lines of communication throughout North Vietnam may now require the full-time services of 200,000 workers (equivalent to about 10 percent of the nonagricultural labor force) and the part-time impressment of another 100,000. An additional 150,000 people are also obligated, on a part-time basis, to serve in various aspects of civil defense which take them away from their normal pursuits. Thus a significant share of the labor force is diverted in varying degrees to supporting the war in the South. The diversion of labor has been supplemented, particularly in the northern provinces, by Chinese logistic support troops.

#### D. Effect on North Vietnam's Allies

In response to the intensified US and Vietnamese air offensive in 1965, all countries of the Communist camp have extended economic assistance as proof of their support. The response on the part of North Vietnam's allies, however, has been more unstinting in political and economic support and much more restrained in the military field. The major economic and military aid programs have been undertaken by the USSR and Communist China. The Eastern European Communist countries have generally extended only token amounts of assistance.

Total assistance extended by China and the USSR in 1965 is on the order of \$250 million to \$400 million, of which military aid accounted for \$150 million to \$200 million.\* This aid is a relatively insignificant drain on the capabilities of both countries. In 1965, for example, the value of military equipment and of economic aid provided to less developed countries of the Free World by the USSR was more than twice that supplied to North Vietnam in the same period.

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\* These estimates are based on the same methodologies as those used in national intelligence estimates. The costing of Soviet military systems in this manner has been carried on over a period of many years.

The USSR is by far the major source of military equipment for North Vietnam, supplying 70 to 95 percent, or \$142 million, of the total provided in 1965. The major components of Soviet military aid were SAM sites (15 to 20), antiaircraft guns (1,000 to 1,200), planes (44), motor vehicles (2,600), radar, and jet fuel. China's identified military aid, totaling only \$11 million, consisted principally of planes (8) and trucks (1,400). In addition, large amounts of infantry weapons and ammunition are provided by Communist China. The inclusion of the cost of this equipment would probably raise the value of China's total contribution by a few million dollars. Military aid from the Eastern European Communist countries -- consisting principally of small arms and ammunition, medicines and medical equipment, and some trucks -- is valued at only a few million dollars.

#### V. The Potential of Air Attacks Against North Vietnam\*

The Rolling Thunder program has been handicapped, as would be any air attack program against North Vietnam, by the absence of an indigenous economic base heavily committed to the support of military operations. Additionally, the ground rules under which the program must operate are highly restrictive, and the air attack has been fragmented on a variety of military and economic target systems. The greatest weight of bombing has been expended on a comparatively invulnerable rudimentary transport network in the southern part of North Vietnam.

If the effectiveness of the campaign is to be raised significantly, two fundamental changes must be made. The first is a basic change in ground rules to remove area and target limitations including mining of the ports. The second is a more rational use of basic principles of target selection.

#### A. Some Principles of Target Selection

The following principles of target selection apply to the analysis of any industry or service that is being considered as a potential target system because of its contribution to military output or to the sustaining of military operations.

1. Use Pattern

This factor covers the extent to which a particular system really contributes to military output or to military operations, to civilian uses, to export, and so forth. Certain of these uses are essential and others are nonessential. The more detail in which a use pattern can be analyzed the more illuminating the process becomes.

2. Depth

This factor covers the travel time of a product from the point of manufacture to the front-line strength of the enemy. The travel time, or lead time, on the steel industry, for example, to the front line is probably on the order of a year or more, whereas the aircraft assembly can be measured in terms of a few months.

3. Cushion

This factor includes a variety of considerations such as the extent to which pre-attack consumption must be cut back before essential requirements are affected, the extent to which the enemy can employ a substitute, the size of stocks, goods in the pipeline, and the like. The most important factor with respect to cushion is the determination of the so-called "critical point," which is the point to which the output of the target industry or service may be reduced without serious effect. Below the critical point the effects begin to be felt with increasing impact.

4. Target Vulnerability

This factor covers the appraisal of the physical vulnerability of a potential target system to attack by existing military means. The size of weaponry available and needed, the level of bombing accuracy which is achievable, the physical hardness of the target, and other pertinent considerations enter into this calculation.

5. Recuperation

This factor covers both the time and size of effort needed to repair or replace the essential parts of a damaged target system. For example, during the Rolling Thunder program the North Vietnamese, with Chinese assistance, have been able to repair 60- to 90-foot railroad bridges in from 48 to 72 hours, to repair 20-foot spans on highway bridges in from 20 to 24 hours, and to replace 100 feet of underwater crossings in from 8 to 10 hours. This speed of recuperation was sufficient to more than maintain the required logistic flows.

## 6. The Principle of Concentration

This factor is of overriding importance in attacks on either tactical or strategic target systems. The principle of concentration fixes attention on two primary factors:

- a. The essentiality of taking all or the major part of any target system under attack, in order to cut through the cushion.
- b. The essentiality of concentrating the attack in point of time to overwhelm the ability to reconstruct, repair, or disperse.

## B. Fragmentation of Attacks

The spreading of bomb tonnage over a great variety of military and economic target systems but attacking no one of these in depth has been characteristic of the Rolling Thunder program. The unattacked targets represent, for any one system, more than adequate capacity to meet all essential requirements. The attacks on major targets in some cases have been phased over such long periods of time that adequate readjustments to meet the disruption had been effected.

## C. The Military Significance of North Vietnam

The significance of North Vietnam to military activities in South Vietnam is measurable in terms of three basic functions which it assumes: (1) as a logistic funnel for the stockage and movement of supplies into South Vietnam; (2) as a source of manpower; and (3) as a control center for the direction of insurgency.

### 1. The Logistic Funnel

The North Vietnamese economy, which is basically one of subsistence agriculture, has only a small modern industrial center concentrated in a few urban centers, including Hanoi, Haiphong, Nam Dinh, Viet Tri, and Thai Nguyen. The country imports little food even in poor agricultural years and depends largely on domestic production to feed its population. Agriculture in 1964 accounted for almost one-half of the gross national product. North Vietnam produces only minor items of military equipment -- grenades, mines, mortars, and ammunition for small arms -- and must import all of its heavy military equipment



and most of its small arms, ammunition, and medical supplies from Communist countries.

## 2. Manpower

A major aspect of North Vietnam's military significance is its capacity both to train and to supply insurgent Viet Cong personnel for later infiltration into South Vietnam and to provide substantial increments of its own population, to serve in South Vietnam or in indirect support functions.

North Vietnam has a population of over 18 million. Since 80 percent of the labor force is engaged in agriculture and is greatly underemployed, this primitive economy has basically large reserves. A large-scale mobilization of manpower had reportedly been under way in North Vietnam during 1965.

The country has about 4 million draft-age males, almost all of whom have been put in the regular armed force, paramilitary organizations, or labor repair and maintenance battalions. An estimated 175,000 males reach draft age each year, of which at least 100,000 are physically fit for military duty.

It is estimated that North Vietnam has the capacity to train and infiltrate the equivalent of nine North Vietnamese battalions each month during 1966, or a total of approximately 54,000 men for the full year. The net additions to be made to the Communist forces in South Vietnam will depend, in addition to decisions on the rate of North Vietnamese infiltration, on the capability of the Viet Cong to train new and replacement troops and the casualty rates inflicted on Viet Cong and North Vietnamese forces during the year. North Vietnam has also demonstrated a capacity to mobilize large numbers of personnel for activities involved in supporting the insurgency in the South.

## 3. Control Center for Insurgency

The function of North Vietnam as the control center for Viet Cong insurgency is well documented in intelligence materials.

The major instrument of political control and direction of the Viet Cong insurgency is the Lao Dong Party, specifically the Committee for the Supervision of the South, which is attached to the Party's Central Committee. The North Vietnamese Communist Party

and government linkage with the National Liberation Front (NLF) is close and clear. Hanoi maintains control over the NLF through the Communist leaders in South Vietnam to whom the North Vietnamese issue overall guidance.

The infiltration routes through Laos and into the three northernmost provinces of South Vietnam apparently are under North Vietnamese military control and direction and within South Vietnam under the control of Viet Cong Military Region V headquarters.

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#### D. The Logistics Target System

##### 1. Results of the 1965 Campaign

During 1965, more than 2,700 strike and flak suppression sorties carrying more than 3,400 tons of ordnance were flown against fixed targets on LOC's in North Vietnam. Relatively few of these targets were located on the railroads and roads north and east of Hanoi. Armed reconnaissance played a very significant additional role in the program to interdict LOC's, but again concentrated for the most part in the southern parts of North Vietnam.

These attacks made it more difficult and expensive for North Vietnam to maintain normal economic activity and to support the war in the South. Nevertheless, overall performance by the modern transport system was maintained at the levels of 1964, even though some important export traffic movements -- for example, that of apatite -- were halted completely. The transport system directly involved in the movement of men and materials to Laos and South Vietnam was able to sustain and to increase the flow of this traffic. At the same time, the number of routes and bypasses was increased, thus making the network less vulnerable to air attack. The results of the interdiction campaign show clearly that the original expectation that it would reduce LOC capacity in the southern part of the country by about two-thirds and even more in the north could not be realized. The North Vietnamese had sufficient recuperability resources so that a two-thirds reduction in capacity was imposed for only a very short period of time if at all. The most successful interdiction -- the Hanoi-Lao Cai rail line -- apparently was effective because of the relatively heavy level of traffic on this line and the fact that it is one of the few major transport routes without alternative means of transportation.

Photographic examination in January 1966 of 26 interdicted highway route segments shows that on 15 segments route capacity had been restored to previous levels, on 2 segments capacity had increased, and on 9 segments capacity had been reduced. Only on two of these nine segments had capacity been reduced more than 25 percent. On one of these, restoration required only a matter of hours; the other was not vital to maintaining traffic flows.

Traffic volume on the major infiltration routes is at levels substantially below -- only rarely over 25 percent -- even interdicted route capacities. Bomb damage on these routes is invariably repaired quickly and inexpensively.

In summary, the rudimentary nature of the logistic targets in the southern part of North Vietnam, the small volume of traffic moving over them in relation to route capacities, the relative ease and speed with which they are repaired, and the extremely high frequency with which they would have to be restruck -- once every three days -- all combine to make the logistics network in this region a relatively unattractive target system, except as a supplement to a larger program.

A significant lesson from the Rolling Thunder program to date is that the goal of sustained interdiction of the rudimentary road and trail networks in southern North Vietnam and in Laos will be extremely difficult and probably impossible to obtain in 1966, given the conventional ordnance and strike capabilities likely to exist. The ease with which bypass roads, river crossings, and ferries can be constructed and the ability to resort to human transport when necessary make these extremely unprofitable targets. This is borne out by experience in both the Korean War and the present conflict. In Korea the interdiction program flew sorties at three times the level of Rolling Thunder against a logistics target system moving almost 250 times the amount of supplies moving into South Vietnam. Yet the North Koreans and Chinese in a defensive position were able to move in their daily logistic requirement and make significant additions to stockpiles. They were, however, unable to mount a sustained offensive due to the logistic supply ceiling imposed by air attack.

The recent effort in Laos during the bombing pause also points out the relative ineffectiveness of conventional interdiction programs against simple high-capacity logistic systems made up of highway targets. During the five-week period of the bombing lull in December 1965 - January 1966, 9,000 sorties (8,000 of which were over the Panhandle) were flown to drop perhaps 18,000 tons of ordnance on the

supply routes to South Vietnam. Despite this effort, the level of truck traffic moving south on these routes was twice the average of 15 trucks per day moving south during the same period in 1965. For these reasons the sortie and ordnance expenditure presently used against supply routes in the southern region could probably be more effectively used against the more lucrative LOC targets in the northern part of North Vietnam.

## 2. A Preferred LOC Target System

The source of logistic supplies not obtainable in South Vietnam for the Viet Cong and North Vietnamese forces and for North Vietnam's defense forces is the military aid being provided by the USSR and China. Although the flow of supplies from these sources cannot be cut off, the movement could be made considerably more expensive and unreliable if authorization is granted to attack intensively the rail connections to Communist China and if the three major ports are effectively mined, thereby closing off the movement of oceangoing ships. At the same time, the flow of imports needed to sustain economic activity in North Vietnam could almost certainly be reduced.

About two-thirds of North Vietnam's imports are carried by sea transport and the remainder move principally over the rail connection with Communist China. Mining the entrances to the three major ports would effectively transfer almost all imports to rail transport. The rail connection to Communist China, which is currently used at only about one-third of capacity, would then be forced to attempt to operate at close to full capacity under interdiction conditions. If production in facilities such as the cement plant, and probably the rubber plant, were halted at the same time, an import requirement would be generated which would be far in excess of rail capacity. The logistics target system in the northern part of North Vietnam would then be more like such a system in a developed economy at war, which is required to maintain high levels of both economic and military traffic. The disruptive effect of interdiction of this rail system would then be more immediately felt. Sustained interdiction of the line would force Hanoi to allocate considerable amounts of manpower and materials to maintain the line and alternate highway routes. The repair of major bridge structures would be measurably more complex and expensive than the relatively simple expedients which keep traffic moving in the southern provinces and in Laos. Sustained 24-hour interdiction and destruction of locomotives and rolling stock by armed reconnaissance would probably stop all daylight traffic and disrupt nighttime traffic, thus slowing down the movement of supplies and making

the logistic resupply of Communist forces considerably less reliable than at present. As a result, some economic requirements at least would go unsatisfied.

The North Vietnamese would probably be forced to make greater use of alternate means of transport such as highways and coastal and inland waterways. Although it would be extremely difficult to interdict these systems, their greater use would increase the opportunities for harassment of actual traffic movements.

The specific program considered would include attacks on 29 major bridges and the four principal railroad yards and shops (see Table 1). The probable increase in aircraft losses resulting from a concentration of air efforts on the northern LOC's has not been analyzed. The initial strikes against these targets would require an estimated 1,670 strike and support sorties and 1,560 tons of ordnance. The restrike effort required to keep these targets interdicted has not been calculated, but it would involve armed reconnaissance on a 24-hour basis. An interdiction program only against the two rail connections to China -- the Hanoi-Lao Cai and Hanoi-Dong Dang lines -- would require an estimated 750 strike and support sorties monthly. Sustained interdiction and armed reconnaissance of the land transport targets in the north would probably require over 3,000 sorties monthly. This program would stop through traffic on major rail routes, but more intensive attacks would probably be necessary to deny the use of these routes for shuttle service. Successful attacks on these 33 land transport targets, the major portion of which are located on the more heavily used transport routes of the country, would be much more effective than attacking minor bridges in the south and other outlying areas, and from the standpoint of identification would be more easily carried out than attacks on the more obscured, smaller, and diverse transport targets in the south.

The interdiction of LOC's, to be effective, must be combined with the mining of the three major ports. The mining program would require initially 104 sorties and only 190 tons of ordnance. The closing of the ports to oceangoing traffic would throw almost all of North Vietnam's import traffic onto the rail connection to China. The Hanoi-Dong Dang line would then be operating at or close to full capacity. Further use would also be made of highway and coastal water routes. If other essential import requirements were generated by neutralization of industrial facilities, such as the Haiphong cement plant, import requirements would then exceed the capacity of the rail line. With only limited highway capacity available, interdiction of

Table 1

Logistics Targets Attacked Under Assumed Intensified Allied Air Offensive

		Estimated Sorties			Ordnance Required (Tons)	25X5
Target Number	Name	Strike	Support	Total		Location by Area
Railroad	Bridges					
	Cao Nung Railroad Bridge over the Song Hoa	88	16	104	39.0	Northeast quadrant rural area
	Lang Con Railroad Bridge NW	28	16	44	42.0	Border buffer zone rural area
	Lang Dang Railroad Bridge over the Song Thuong	24	16	40	36.0	Border buffer zone rural area
	Vu Chua Railroad Bridge over the Suoi Ngang	88	16	104	39.0	Northeast quadrant rural area
Highway Bridges						
	Haiphong Highway Bridge over the Song Da Bach	35	18	53	50.0	Haiphong restricted zone rural area (mud flats)
	Kep Highway Bridge over the Song Thuong	35	18	53	50.0	Northeast quadrant near villages
	Thai Nguyen Highway Bridge over the Song Cau	35	18	53	50.0	Northeast quadrant near villages
	Ha Gia Highway Bridge over the Song Cong	22	16	38	49.5	Hanoi restricted zone near villages

Table 1  
(Continued)

Number	Name	Estimated Sorties			Ordnance Required (Tons)	Location by Area 25X5
		Strike	Support	Total		
Highway Bridges (Continued)						
	Dan Phuong Highway Causeway over the Song Day	8	16	24	18.0	Hanoi restricted zone near villages
	Xuan Mai Highway Bridge North over the Song Con	34	24	58	25.5	Hanoi restricted zone near villages
	Long Khap Highway Bridge	40	16	56	90.0	Border buffer zone rural area
	Bac Can Highway Bridge over the Song Cau	35	18	53	50.0	Northeast quadrant near villages
	Lam Luong Highway Bridge over the Song Mo Ga	35	18	53	50.0	Northeast quadrant rural area
	On Highway Bridge over the Song Thuon	32	16	48	24.0	Border buffer zone near villages
	Me Xa Highway Bridge over the Song Ky	35	18	53	50.0	Northeast quadrant near villages
	Chieng Chang Highway Bridge	32	16	48	48.0	Northeast quadrant rural area
	Loc Binh Highway Bridge	34	16	50	76.5	Border buffer zone rural area

Table 1  
(Continued)

Number	Name	Estimated Sorties			Ordnance Required (Tons)	Location by Area 25X5	25X1
		Strike	Support	Total			
Highway Bridges (Continued)							
	Xuan Mai Highway Bridge SW over the Song Day	50	16	66	112.5	Hanoi restricted zone near villages	
	Ha Chanh Highway Bridge North	22	16	38	33.0	Border buffer zone rural area	
	Lam Highway Bridge NE	56	16	72	42.0	Northeast quadrant rural area	
Combination Bridges							
	Hai Duong RR/Highway Bridge over the Song Thai Binh	35	19	54	49.5	Hanoi restricted zone near villages	
	Hanoi RR/Highway Bridge over the Red River	34	24	58	76.5	Hanoi restricted zone near villages	
	Hanoi RR/Highway Bridge over the Song Duong (Canal Des Rapides)	28	20	48	63.0	Hanoi restricted zone near villages	
	Viet Tri RR/Highway Bridge over the Song Lo (Riviere Claire)	22	24	46	49.5	Hanoi restricted zone near villages	25X5
	Dap Cau RR/Highway Bridge over the Song Cau	28	16	44	63.0	Hanoi restricted zone near villages	
	Lang Son RR/Highway Bridge over the Song Ky Cung	22	16	38	49.5	Border buffer zone densely populated	



Table 1  
(Continued)

Number	Name	Estimated Sorties			Required (Tons)	Location by Area	25X1
		Strike	Support	Total			
Combination Bridges (Continued)							25X5
	Co Trai RR/Highway Bridge over the Song Thuong	32	16	48	48.0	Hanoi restricted zone near villages	
	Bac Giang (Phu Lang Thuong) RR/Highway Bridge over the Song Thuong	22	20	42	49.5	Hanoi restricted zone near villages	
	Hai Duong RR/Highway Bridge East over the Song Rang	35	19	54	49.5	Northeast quadrant rural area	
Railroad Yards and Shops							
	Yen Vien railroad classification yard	6	24	30	13.5	Hanoi restricted zone near villages	
	Hanoi railroad car repair shops at Gia Lam	6	24	30	13.5	Hanoi restricted zone near villages	
	Hanoi railroad station and classification yard	18	24	42	40.5	Hanoi restricted zone densely populated	
	Thai Nguyen railroad station yards and shops	8	24	32	18.0	Northeast quadrant near industrial complex	25X5

Table 1  
(Continued)

		<u>Estimated Sorties</u>			<u>Required (Tons)</u>	<u>Location by Area</u>
<u>Number</u>	<u>Name</u>	<u>Strike</u>	<u>Support</u>	<u>Total</u>		
Mineable Areas		25X5				
	Cam Pha Mineable Area	8	12	20	25	Northeast quadrant rural area
	Hon Gai Mineable Area	20	12	32	74	Haiphong restricted zone rural area
	Haiphong Mineable Area	36	16	52	91	Haiphong restricted zone rural area

northern transport lines would then have a more immediate and direct impact. The flow of military supplies into North Vietnam and onward to South Vietnam would be slowed up and made more costly. Some economic imports would probably have to be foregone. In summary, the North Vietnamese regime would, by this program, be brought under far stronger pressures from air attacks than resulted from the pattern of airstrikes in 1965. At the same time, however, it is believed that this program would place no real restraint on the level of Communist activity in South Vietnam until requirements for resupply become much higher than now estimated.

### 3. Some Limits to Resupply

The upper limits on the level and cost of logistic support which the Hanoi regime would be willing to sustain cannot be quantified at this time. Several factors are relevant to the determination of that level. One factor is the limit to which local labor can be diverted to maintain the supply lines and support the logistic effort without an unfavorable impact on essential industrial and/or agricultural production. Substantial additional diversion of labor could necessitate imports of food to make up for production lost because of a shortage of farm labor. This could aggravate existing internal distribution and import programs, particularly if the major ports were closed and the rail and highway connections to China were being subjected to heavy interdiction.

A direct influence on logistic needs is the extent to which allied offensive operations in South Vietnam can force the Communists to use supplies at a higher rate or deny them access to existing stockpiles. If, for example, the buildup and level of combat projected for the end of 1966 also involved a total dependence on external sources for supplies, the North Vietnamese would have to supply about 250 tons a day to the insurgent forces in South Vietnam.

### E. The "Will of the Regime" as a Target System

In addition to Hanoi's estimate of the US will to continue the war, three main factors appear to affect the determination of the regime to continue to support the war in South Vietnam: (1) the course of the war; (2) the degree of political and material support for the policy rendered the regime by its two main allies, the USSR and Communist China; and (3) the economic, social, and political consequences of supporting the war in South Vietnam within North Vietnam itself. The effort required in supporting the war in South Vietnam draws very

little on the physical resources of North Vietnam. The neutralization of given target systems within North Vietnam, however, would exact an increasing cost as the price to be paid for supporting the insurgency.

If air attack is to be a significant factor in the attaining of US objectives, a substantial revision must be made in the self-imposed ground rules. Air attack can increase significantly the price which North Vietnam pays to continue the war and reduce the ease with which it carries on its support of the war in the South.

A preliminary ranking has been made of the various possible target systems with the exception of lines of communication (which is discussed elsewhere) in a rough order of their importance to the military effort. This section presents a judgment on the feasibility or desirability of subjecting them to air attack at the current stage of the campaign and evaluates the probable impact of a postulated attack. Estimates of the forces and ordnance required for attack are presented only for those target systems which presently are in the preferred systems for a revised Rolling Thunder (see Tables 2 and 3). Six target systems have been considered: (1) the military supply system, (2) the military/economic system, (3) the modern industrial system, (4) the command and control system, (5) an agricultural system, and (6) the manpower system.

Extension of Rolling Thunder at this time is considered only for the first two target systems, in addition to the LOC system discussed separately. The details of these attacks are shown in the tables included.

#### 1. Military Supply Targets

Twenty-six military barracks and/or supply targets remain unattacked although they are on the JCS target list (see Table 2). Since almost all of these are in the "sanctuary" areas, the extent to which they are occupied is not known. If reconnaissance were to reveal a significant level of activity at these facilities, they would be valid military targets whose neutralization would impede the flow of military supplies and disrupt military training programs in North Vietnam. The barracks on the list are those believed to be associated with military training programs in support of the infiltration. Virtually simultaneous attack would be needed for effectiveness, particularly the barracks attacks. Based on previous experience we can assume that these barracks will be abandoned after the first strike. The effect would be increasingly disruptive if other attacks on military/economic

Table 2  
Military Supply Target System

JCS Target Number	Name	Estimated Sorties			Ordnance Requirement (Tons)	Remarks
		Strike	Support	Total		
Barracks						
						25X5
	Xuan Mai SSW	44	24	68	99.0	Hanoi Circle near villages
	Xuan Mai NNW	28	24	52	63.0	Hanoi Circle rural area
	Ha Dong Barracks/ Supply Depot	100	32	132	225.0	Hanoi Circle near villages
	Vinh Yen North	46	20	66	103.5	Hanoi Circle near villages
	Son Tay SW	34	20	54	76.5	Hanoi Circle rural area
	Kep Ha NE	64	28	92	144.0	NE Quadrant near villages
	Trai Thon	24	16	40	54.0	Hanoi Circle near villages
	Vinh Yen NNE	26	20	46	58.5	Hanoi Circle rural area
	Phu Tho NW	18	16	34	40.5	NW Quadrant rural area
	Ngoc Thai	18	16	34	40.5	NW Quadrant near villages

Table 2  
(Continued)

JCS Target Number	Name	Estimated Sorties			Ordnance Requirement (Tons)	25X5
		Strike	Support	Total		Remarks
	Son Dong SSE	54	16	70	121.5	Hanoi Circle rural area
	Kep South	20	16	36	45.0	NE Quadrant rural area
	Chi Ne	18	16	34	40.5	Southern rural area
	Bien Son NNE	132	20	152	297.0	Southern near villages
	Nom Son	8	8	16	18.0	Southern
Ammunition depots						
	Haiphong	76	28	104	114.0	Haiphong Circle near villages
	Vinh Yen	32	20	52	48.0	Hanoi Circle near villages
	Hon Gai Explosives Storage	28	12	40	42.0	NE Quadrant rural area
	Cam Ly	24	20	44	36.0	NE Quadrant rural area
	Bac Giang	20	16	36	45.0	Hanoi Circle rural area

25X1

25X5

Table 2  
(Continued)

JCS Target Number	Name	Estimated Sorties			Ordnance Requirement (Tons)	Remarks
		Strike	Support	Total		
Supply/ordnance depots						25X5
	Hanoi South	28	24	52	21.0	Hanoi Circle densely populated
	Hanoi North	30	20	50	22.5	Hanoi Circle densely populated
	Thai Nguyen North	14	20	34	10.5	Northeast quadrant near villages
	Van Dien	16	20	36	12.0	Hanoi Circle near villages
	Van Dien Vehicle Depot	58	32	90	43.5	Hanoi Circle near villages
	Son Tay	34	24	58	25.5	Hanoi Circle near villages
Total		<u>994</u>	<u>528</u>	<u>1,522</u>	<u>1,846.5</u>	

and LOC targets are carried out simultaneously, in order to obtain a maximum disruption of the flow of essential military supplies into North Vietnam and their eventual redistribution to military consumers.

## 2. Military/Economic Targets

The economic targets in North Vietnam's modern industrial base which have a direct bearing on the regime's ability to support the war in the South are the major bulk petroleum storage facilities and the Haiphong cement plant (see Table 3). The petroleum storage installations sustain the supply and distribution activities within North Vietnam and through Laos, and are vital to the mobility of North Vietnamese military forces and to distribution and transport services for the civilian economy. The Haiphong cement plant as the sole producer in North Vietnam provides a major input to both normal construction activity and the reconstruction programs necessitated by Rolling Thunder attacks. Intelligence may reveal other war-supporting facilities falling in this category.

The extension of airstrikes against eight major POL storage terminals would deprive the regime of all but some 10,000 tons of storage dispersed in a variety of untargeted locations, including some 2,200 tons in small buried tanks at seven newly identified dispersed storage facilities. In addition, about 4,000 tons of residual capacity would remain in sites previously struck. The planned attacks would eliminate the principal bulk petroleum terminals in North Vietnam. Remaining storage would be less than one month's supply at 1965 levels.

A minimum of 440 sorties, comprising 280 strike aircraft and 160 support, will probably be required to neutralize these facilities. The ordnance requirement for these targets is estimated to be about 850 tons.

If the attack is to obtain optimum effect, it is imperative that it be carried out almost simultaneously on all petroleum storage targets. Simultaneous attack insures the most certain way of eliminating the cushion represented by excess storage capacity and stocks and of preventing countermeasures such as dispersal and thus of reaching the critical point in meeting essential requirements. The loss of petroleum storage facilities -- and their contents -- would have an immediate effect on the economy. The effect on normal industrial production activities would be slight because most of the industrial enterprises in North Vietnam rely on coal or electricity for energy. The major effect in the civilian economy would be in transportation and distribution.



Table 3

## Military/Economic Target System

JCS Target Number	Name	Capacity (Metric Tons)	Estimated Sorties			Ordnance Requirement (Tons)	Remarks
			Strike	Support	Total		
Petroleum storage facilities a/							
	Haiphong	72,000	58	24	82	196.0	Haiphong Circle near villages
	Hanoi (Thanh Am)	34,000	36	24	60	121.5	Hanoi Circle rural area
	Phuc Yen	14,000	50	24	74	169.0	Hanoi Circle rural area
	Duong Nham	14,000	38	20	58	85.5	Hanoi Circle near villages
	Nguyen Khe	13,000	40	20	60	135.0	Hanoi Circle near villages
	Do Son	8,000	22	12	34	49.5	Haiphong Circle near villages
	Bac Giang (Phu Lang Thuong)	6,000	20	16	36	45.0	Hanoi Circle near villages
	Viet Tri	4,000	20	20	40	45.0	Hanoi Circle near villages
	Total	<u>165,000</u>	<u>284</u>	<u>160</u>	<u>444</u>	<u>846.5</u>	
Cement plant							
	Haiphong	700,000 to 800,000	4	16	20	13.5 b/	Haiphong Circle densely populated

a. Previous strikes at four facilities have eliminated almost 37,000 tons of capacity.

b. Computed on the basis of an attack on the electric powerplant. The ordnance requirement would be heavier if the cement plant itself were attacked.

A sustained loss of petroleum storage facilities coupled with an inability to import even minimum operating requirements would have its greatest effect on military operations. North Vietnamese military forces account for about 60 percent of total petroleum consumption, or a monthly average of about 8,500 tons. North Vietnam with Chinese cooperation would probably be able after an initial period of disruption to maintain petroleum imports at almost normal levels even after the intensified attacks discussed in this report. Therefore, the supply of essential imports of petroleum for military requirements would appear to be almost certain.

Nevertheless, the attack would compound the difficulties of maintaining the flow of imports and military aid on the land transport connections to Communist China. The difficulties would be increased as attacks on other target systems increased the traffic flows in these land and coastal water transport routes.

An attack on the Haiphong cement plant would, by neutralizing North Vietnam's only producer of cement, create a major impediment to reconstruction and repair programs, at least in the short run. Over the longer term, cement could be imported from China. The import requirement could be on the order of 700,000 to 800,000 tons a year to meet all military and economic needs. If this volume were required, it would mean a doubling of the present tonnage of all seaborne imports, but it is probable that the total current requirements would not be considered essential under stringent transport conditions. If the cement and all seaborne imports had to be carried on the rail line from China, the total traffic volume would be in excess of the normal capacities of the Hanoi-Dong Dang rail line and the highway connections to China, and far in excess of their capacity under conditions of interdiction.

### 3. Industrial Targets

North Vietnam's small modern industrial sector contains a few highly prized and nominally lucrative industrial targets. Principal among these are the Hanoi machine building plant, the iron and steel plant at Thai Nguyen, and the Viet Tri chemical combine.

These plants and an additional 11 smaller plants constitute almost all of the modern industrial targets. They could be taken under attack by airstrikes involving about 500 sorties and the expenditure of slightly over 500 tons of ordnance. Alternatively a successful attack on the main electric power facilities could effectively put almost all of these plants out of operation.

Such an attack is often postulated as one which by depriving Hanoi of almost all of its modern economy and the major hallmarks of its economic progress will persuade the regime to enter into negotiations to end the war. This outcome is uncertain and probably unlikely. North Vietnam's modern industrial economy makes almost no direct or significant contribution to the war effort, which is sustained materially almost exclusively by supplies from other Communist countries. Since North Vietnam is essentially a subsistence economy, the modern industrial sector makes only a limited contribution to economic activity. The loss of industrial production would have almost no impact on the great mass of this agrarian society. The small element of the population directly affected would hardly be sufficient, or disposed, to persuade the regime to stop the war. For these reasons an attack on the modern industrial base of itself would not be likely to attain US objectives.

The experience of the Korean War also supports this judgment. Korea in 1950 was a country with a population considerably smaller and an industrial base much larger than those of North Vietnam in 1965. Most of Korea's modern industry was destroyed in the first three months of the war. One year later, hydroelectric plants were attacked to increase pressures on the regime. Attacks in the spring of 1953 against irrigation dams brought further pressure on the Korean leadership. This carefully phased program failed to force the enemy to accept UN truce proposals. In both North Korea and North Vietnam it is clear that the modern industrial base is too small to serve as a testing ground for the "hostage" concept of industrial destruction as a means of deterring aggression.

This potential target system does serve to provide a list of optional targets for possible use when other air attacks or activities in South Vietnam might produce indications of a weakening of Hanoi's determination to carry on with the war. At such a point, attacks on industrial targets could provide additional psychological pressure on the regime and the morale of its people.

4. The Command and Control, Agricultural, and Manpower Targets

The attacks on these targets are not recommended at this time. In each case the effects of the attacks are debatable and are likely to provoke hostile reaction in world capitals.

The breaching of the agricultural levees in the Red River delta region would be extremely difficult to do successfully and, moreover, would probably be rejected on humanitarian grounds. Even if carried out, any resultant loss of food supplies would fall on the lowest priority groups in the population.

The command and control system consists essentially of major communications facilities and the national headquarters of the Ministry of National Defense, and the Party-Government Building Complex at Hanoi. All of these headquarters are located in built-up sections of the Hanoi sanctuary. An attack on them would require about 360 sorties and an estimated 445 tons of ordnance. The effect of these attacks is debatable. North Vietnam's reliance on high-frequency radio facilities means that essentially the communications system for command and control purposes is invulnerable to air attack. Moreover, known changes in North Vietnam's command and control system and plans for decentralization and the establishment of alternate control centers would, if in operation at the time of attacks, tend to reduce their impact on Hanoi's ability to maintain order and control. Mass attacks on the major control and command centers which are located in densely populated urban areas would provoke a hostile reaction in other world capitals. For this reason and since the outcome of these attacks is debatable, this course of action is not recommended at this time.

The highest price to be imposed in North Vietnam would be represented by large-scale attacks on cities in order to maximize the number of casualties among skilled workers, thereby reducing their contribution to mobilization potential and to the maintenance of a viable economy. No calculations of the number of sorties, the volume of ordnance, or the probable number of casualties to be achieved by mass attacks on the eight urban cities have been made. To the extent that the attacks produce mass casualties and have a sufficiently harmful effect on civilian morale, the regime might find it increasingly difficult to continue with the war and might become more receptive to negotiations. However, attacks designed solely to produce mass casualties among a civilian population would be most difficult to support or justify at this stage of the war.